

WQB "Wide Aperture Quad" for Main Injector

3 February 2005

IB2 conference room

9:00 AM

Attendees: Linda Alsip, John Carson, Weiren Chou, TJ Gardner, Dave Harding, Vladimir Kashikhin, Lucy Nobrega, John Zweibohmer

Magnet design status

The magnet drawing count is now 35 of 55 drawings complete. All the detail parts drawings have been released for procurement except the bussing and the beam tube ends, which are still under discussion. Some assembly drawings also remain, with the trim coil assembly drawing being next in line. The tooling drawing count stands at 59 of 62, with the unfinished drawings documenting the set-up of the tooling, not the equipment itself.

The main coil winding traveler is ready for review. The insulation traveler is started. The core stacking traveler is complete. The trim coil winding traveler is next. The travelers should not be a limiting factor.

After reviewing the numbers, Vladimir is concerned that the magnet may be too strong. He requested that the length of the stacked core be reduced a little to extend the range over which the pole tip length can be adjusted. John C felt that this was straightforward, so we will do it that way. AD needs to determine whether they prefer to match the strengths to the IQB at injection or extraction. We need to decide whether to make all the cores the same or to adjust the length based on the first article. Making the adjustment would make the subsequent magnets tidier, but would make them different and would delay the schedule.

There are some discrepancies in various versions of the magnet parameters table. Vladimir, John, and Dave will work to resolve them.

Procurement status

The main coil winding fixture has arrived, has been inspected, and is being mounted on the bandstand. Conductor for the first magnet will be delivered to IB1 as soon as it is needed. We are waiting for the winding shims, the spacers that hold room for insulation between turns. They are due next Wednesday (9 February). Winding should be able to start immediately after that.

The curing fixture is in VMS. It is due 24 February.

The trim coil winding fixture is here and being inspected. It will be used on another winder in parallel starting soon thereafter.

All the stacking fixture parts arrived, but they had not been assembled and aligned, tasks that the vendor was supposed to do. It was returned to the vendor and is due back on Monday (7 February).

A roll over fixture that will be needed during magnet assembly is due 18 February.

The vendor expects to complete the raw beam tube 11 April if the tooling works are planned. They should start forming it in mid-March. Gregg Kobliska will visit them at an appropriate time.

Beam tube transitions

The beam tube is 316L stainless steel. Lucy provided a sample clamp for the vacuum seal so that the designers could be sure of what they need to leave clearance for.

Lucy showed a transition piece going from the beam tube's star shape to Main Injector oval in 4". It might be possible to form the shape from a cone. It might be easier to form it in halves or quarters, then weld it together. It might also be possible to swage the end of the star tube back to round or oval.

After some discussion it was decided that we would achieve the best balance between accelerator performance, where aperture and smooth transitions are paramount, and practicality, where uniformity is important, by standardizing on two styles of beam tube while keeping the magnet the same. This will allow there to be one spare configured in each style.

Style 1 will be used between the Lambertsons of the high energy extraction points. Longitudinal space constraints are tightest here and the step transition to the Lambertson pole makes a gentle slope pale in comparison. There is a small difference in the longitudinal space available at the two ends, however in at least one case the BPM is at the opposite end of the magnet from the others. We agree to make the two end transitions the same, tapering from star to round as gently as possible within the return end coils. The space available at the lead end depends on whether any convolutions can be squeezed out of the bellows between the quad and the Lambertson. Lucy will consult with Terry Anderson, who was responsible for Main Injector vacuum.

Style 2 will be used at the other three locations. At those locations there is much more room, with at most a nearby trim dipole, but each one is different. Lucy, Weiren, Dave Johnson, and Bruce Brown will look at those areas in more detail and propose a single transition length that will work in all three locations. This might be as much as 15" on each end to extend through a trim dipole.

TD will determine from the vendor the longest tube length possible. Based on that, a plan will be developed for fabricating the needed transition pieces.

Schedule

The main coil winding fixture has arrived, has been inspected, and is being mounted on the bandstand. Conductor for the first magnet will be delivered to IB1 as soon as it is needed. We are waiting for the winding shims, the spacers that hold room for insulation between turns. They are due next Wednesday (9 February). Winding should be able to start immediately after that.

The stacking fixture arrived, but had not been assembled, so it was returned to the vendor. It is due back here 7 February. The first end plates are due 24 February. Once they are inspected, stacking can begin.

With the budgeted one month of adjustments to the magnet end, the earliest delivery date for the first magnet is now 2 June. The master schedule shows completion of the seventh magnet at the end of October. TD needs to look at ways to compress that schedule.

Rumors floating around suggest that management is highly unlikely to allow a one-week shutdown in the early summer for installation of the first WQB magnet. Main Injector really wants to run for a while with one magnet before installing the rest. If they can't install the first one until the eight-week shutdown, then they would want to defer installing the rest. One current rumor is that the 8 August start of shutdown date is likely to slip due to D0 silicon delays. Another rumor

says that the shutdown might be structured as one week off, then run Booster, Main Injector, and P-Bar for a week, then off for six weeks. That might provide enough time to install a magnet in the first week, run for a week, then install the rest.

Cost

No cost estimate was ever declared as the baseline. The last spreadsheet we have found, from June 2004, double counts the fabrication labor. An earlier version did not take into account the jump in steel price that we experienced. Neither estimate included contingency. It was agreed to establish the June version as the baseline with the double counted labor removed and contingency added.

Next meeting in two weeks: Thursday, 17 February 2005. Same time, same place.